1871MNRAS..32....7S

utterly impossible it is that so marked a peculiarity can have the imagined explanation.*

Apart from this, the curved branches will be found, on a close scrutiny, not to agree exactly with the direction of declination-parallels; and all of them can be traced in Argelander's large charts, when these are carefully studied.

A circumstance of some interest is to be recognised in the fact that these branching extensions are found to lead, in almost every instance, towards regions of the heavens where many nebulæ exist.

The rich stellar region of *Orion*, as well as the *Hyades* and *Pleiades*, are shown to be intimately associated with the Milky Way.

In conclusion, I may remark that although the results to which this chart seems to point may appear altogether opposed to accepted views respecting the construction of the heavens, they accord exceedingly well with the enlarged views formed by Sir W. Herschel towards the close of his career as an observer,† and even better with the views towards which his later researches *pointed.* The mode of research I have adopted is altogether new, and it is one which seems more likely to lead to clear views of the construction of the heavens than any yet employed; for it presents before the eye at one view what hitherto has had to be inferred from tabulated figures. It is capable of a far wider extension, however; and I could wish that others who have more leisure than I can afford would aid in this interesting branch of inquiry. To such I would repeat the words by which Sir John Herschel, two years ago, encouraged me to fresh inquiries: "Be not deterred," he wrote on August 1, 1869, "from dwelling closely and consecutively on these inquiries, by any idea of their hopelessness which the objectors against 'paper astronomy' may entertain, or by the real slenderness of the material threads out of which any connected theory of the universe has at present to be woven."

Brighton, 8 *Nov.* 1871.

Extract of a Letter from E. J. Stone, Esq., to the Astronomer Royal, dated Royal Observatory, Cape of Good Hope, Sept. 30, 1871.

"I had hoped to have been able to forward the Catalogue for 1858 and 1859 by this mail, but my work has been nearly stopped through illness [of some of the Assistants]. The year 1859 is much richer in Southern stars than the other years. I hope to have the years 1857, 1858, and 1859 ready for press within a month."

---

* This does not preclude the possibility that there may be in places a tendency to "meridional" or "parallel" *graining*, so to speak; but of a much finer nature than the peculiarity referred to in the text, and in no way affecting the chart's real significance.

† I except the papers of 1817 and 1818.

1871MNRAS..32....7S

On the Expression of Delaunay's l, g, h, in terms of his finally adopted Constants. By Prof. Cayley.

We have in Delaunay's lunar theory,—

l, the mean anomaly of the Moon,
g, the mean distance of perigee from ascending node,
h, the mean longitude of ascending node,

quantities which vary directly as the time, the coefficients of t, or values of $\frac{dl}{dt}, \frac{dg}{dt}, \frac{dh}{dt}$, being given in his *Théorie du Mouvement de la Lune*, vol. ii. pp. 237, 238. But these values are not expressed in terms of his constants a (or n), e, γ, finally adopted as explained p. 800, and it seems very desirable to obtain the expressions of l, g, h, in terms of these finally adopted constants: I have accordingly effected this transformation (which I found less laborious than I had anticipated). It will be convenient to imagine the a, n, e, γ of pp. 237, 238 replaced by A, N, E, Γ respectively. This being so, and writing m for the $\frac{n}{n'}$ of p. 800 we have, p. 800,—

$$\begin{aligned} A = a \Big\{ & 1 + \left[-\frac{3}{4}m^2 - \frac{825}{256}m^3 \right] \frac{a^2}{a'^2} \\ & + \left(-\frac{2}{3} + 3\gamma^2 - \frac{3}{4}e^2 - e'^2 - 2\gamma^2 + \frac{5}{2}\gamma^2 e^2 + \frac{9}{2}\gamma^2 e'^2 - \frac{1}{16}e^4 - \frac{9}{8}e^2 e'^2 - \frac{5}{4}e'^4 \right) m^2 \\ & + \left(-\frac{9}{4}\gamma^2 - \frac{225}{16}e^2 + \frac{45}{8}\gamma^4 + \frac{81}{2}\gamma^2 e^2 - \frac{23}{4}\gamma^2 e'^2 + \frac{675}{128}e^4 - \frac{825}{16}e^2 e'^2 \right) m^3 \\ & + \left(\frac{1705}{288} - \frac{1529}{64}\gamma^2 - \frac{14639}{256}e^2 + \frac{7469}{192}e'^2 \right) m^4 \\ & + \left(\frac{787}{48} - \frac{9323}{256}\gamma^2 - \frac{227555}{1024}e^2 + \frac{7083}{32}e'^2 \right) m^5 \\ & + \frac{5887}{162}m^6 \\ & + \frac{29809}{432}m^7 \end{aligned}$$

and hence calculating N from the formula $N^2 A^3 = n^2 a^3$, we find

$$N = n \Big\{ 1 + \Big[\frac{9}{} m^2 + \frac{2475}{} m^3 \Big] \frac{a^2}{}$$

1871MNRAS..32....7S

$$
\begin{aligned}
&+\left(1-\frac{9}{2}\gamma^2+\frac{9}{8}e^2+\frac{3}{2}e'^2+3\gamma^4-\frac{15}{4}\gamma^2e^2-\frac{27}{4}\gamma^2e'^2+\frac{3}{32}e^4+\frac{27}{16}e^2e'^2+\frac{15}{8}e'^4\right)m\\
&+\left(\frac{27}{8}\gamma^2+\frac{675}{32}e^2-\frac{135}{16}\gamma^4-\frac{243}{4}\gamma^2e^2+\frac{69}{8}\gamma^2e'^2-\frac{2025}{256}e^4+\frac{2475}{32}e^2e'^2\right)m^3\\
&+\left(-\frac{515}{64}+\frac{3627}{128}\gamma^2+\frac{44877}{512}e^2-\frac{7149}{128}e'^2\right)m^4\\
&+\left(-\frac{787}{32}+\frac{30849}{512}\gamma^2+\frac{754665}{2048}e^2-\frac{21249}{64}e'^2\right)m^5\\
&+\left(-\frac{13183}{192}\right)m^6\\
&+\left(-\frac{20807}{144}\right)m^7.
\end{aligned}
$$

$= n(1+Q)$ suppose ∴

The values of E, Γ are given p. 800, but for the present purpose we only require E^2, and Γ^2 to the fifth order, viz. the values of these are at once found to be

$$E^2=e^2\left(1+\frac{81}{64}m^2-\frac{2595}{128}m^3\right)$$

$$\Gamma^2=\gamma^2\left(1+\frac{57}{64}m^2-\frac{129}{128}m^3\right)$$

whence also $E^4=e^4$ and $\Gamma^4=\gamma^4$.

The formulæ of pp. 237–238 now give

$$
l=nt\left\{1+\left[-\frac{81}{32}m^2-\frac{2475}{512}m^3\right]\frac{a^2}{a'^2}+Q\right.
$$

$$
+\left\{\begin{aligned}
&\left(-\frac{7}{4}+\frac{21}{2}\gamma^2-\frac{3}{4}e^2-\frac{21}{8}e'^2+\frac{33}{4}\gamma^4-\frac{39}{8}\gamma^2e^2+\frac{63}{4}\gamma^2e'^2-\frac{9}{8}e^2e'^2-\frac{105}{32}e'^4\right)m^2\\
&+\left(\frac{1197}{128}\gamma^2-\frac{243}{256}e^2\right)m^4\\
&+\left(-\frac{2709}{256}\gamma^2+\frac{7785}{512}e^2\right)m^5
\end{aligned}\right\}(1+Q)^{-}
$$

1871MNRAS..32....7S

$$
\begin{aligned}
&+\left\{\begin{aligned}&\left(-\frac{225}{32}+\frac{81}{4}\gamma^2-\frac{675}{64}e^2-\frac{825}{32}e'^2-\frac{243}{4}\gamma^4+\frac{1863}{32}\gamma^2e^2+\frac{629}{8}\gamma^2e'^2+\frac{2025}{256}e^4-\frac{2475}{64}e^2e'^2\right)m^3\\&\qquad+\left(\frac{4617}{256}\gamma^2-\frac{54675}{4096}e^2\right)m^5\end{aligned}\right\}(1+Q)^{-2}\\
&+\left(-\frac{3265}{128}+\frac{3345}{32}\gamma^2-\frac{7089}{256}e^2-\frac{48225}{256}e'^2\right)m^4(1+Q)^{-2}\\
&+\left(-\frac{243925}{2048}+\frac{175425}{256}\gamma^2-\frac{167835}{2048}e^2-\frac{1502265}{1024}e'^2\right)m^5(1+Q)^{-4}\\
&+\left(-\frac{12626759}{24576}\right)m^6(1+Q)^{-}\\
&+\left(-\frac{1365131021}{589824}\right)m^7(1+Q)^{-7}
\end{aligned}
$$

(Observe that writing herein $Q=0$, and omitting the terms in m^4 and m^5 in the coefficient of $(1+Q)^{-1}$, and the term in m^5 in the coefficient of $(1+Q)^{-2}$, we have the original formula of p. 237)

$$
\begin{aligned}
g=nt\Bigg\{\quad&\left[\frac{45}{16}m^2+\frac{585}{32}m^3\right]\frac{a^2}{a'^2}\\
&+\left\{\begin{aligned}&\left(\frac{3}{2}-\frac{15}{2}\gamma^2+\frac{9}{8}e^2+\frac{9}{4}e'^2-\frac{45}{4}\gamma^4+15\gamma^2e^2-\frac{45}{4}\gamma^2e'^2-\frac{27}{64}e^4+\frac{27}{16}e^2e'^2+\frac{45}{16}e'^4\right)m^2\\&\qquad+\left(-\frac{855}{128}\gamma^2+\frac{729}{512}e^2\right)m^4\\&\qquad+\left(\frac{1935}{256}\gamma^2-\frac{23355}{1024}e^2\right)m^5\end{aligned}\right\}(1+Q)^{-1}\\
&+\left\{\begin{aligned}&\left(\frac{27}{4}-\frac{351}{16}\gamma^2-\frac{297}{64}e^2+\frac{401}{16}e'^2+\frac{135}{2}\gamma^4-\frac{1053}{32}\gamma^2e^2-\frac{1297}{16}\gamma^2e'^2+\frac{675}{256}e^4-\frac{1079}{64}e^2e'^2\right)m^3\\&\qquad+\left(-\frac{20007}{1024}\gamma^2-\frac{24057}{4096}e^2\right)m^5\end{aligned}\right\}(1+Q)^{-2}\\
&+\left(\frac{1995}{64}-\frac{7989}{64}\gamma^2-\frac{9969}{256}e^2+\frac{29535}{128}e'^2\right)m^4(1+Q)^{-3}\\
&+\left(\frac{17709}{}-\frac{376653}{}\gamma^2-\frac{440787}{}e^2+\frac{883245}{}e'^2\right)m^5(1+Q)^{-4}
\end{aligned}
$$

1871MNRAS..32....7S

$$+\frac{2431349}{4096}m^6(1+Q)^{-5}$$
$$+\frac{62329307}{24576}m^7(1+Q)^{-6}$$

(where writing $Q=0$, and omitting the terms in m^4 and m^5 in the coefficient of $(1+Q)^{-1}$, and the term in m^5 in the coefficient of $(1+Q)^{-2}$, we have the original formula of p. 237). And

$$\begin{aligned}
h=nt\Big\{\;&\left[-\frac{45}{32}m^2-\frac{1935}{512}m^3\right]\frac{a^2}{a'^2}\\
&+\left\{\begin{array}{l}\left(-\frac{3}{4}+\frac{3}{2}\gamma^2-\frac{3}{2}e^2-\frac{9}{8}e'^2-\frac{51}{8}\gamma^2e^2+\frac{9}{4}\gamma^2e'^2+\frac{21}{64}e^4-\frac{9}{4}e^2e'^2-\frac{45}{32}e'^4\right)m^2\\ \qquad+\left(\frac{171}{128}\gamma^2-\frac{243}{128}e^2\right)m^4\\ \qquad+\left(-\frac{387}{256}\gamma^2+\frac{7785}{256}e^2\right)m^5\end{array}\right\}(1+Q)^{-1}\\
&+\left\{\begin{array}{l}\left(\frac{9}{32}-\frac{27}{16}e^2-\frac{189}{32}\gamma^2+\frac{23}{32}e'^2+\frac{27}{16}\gamma^4+\frac{567}{16}\gamma^2e^2-\frac{99}{16}\gamma^2e'^2-\frac{675}{256}e^4-\frac{349}{16}e^2e'^2\right)m^3\\ \qquad+\left(-\frac{1539}{1024}\gamma^2-\frac{15309}{2048}e^2\right)m^5\end{array}\right\}(1+Q)^{-2}\\
&+\left(\frac{177}{128}-\frac{195}{64}\gamma^2-\frac{699}{32}e^2+\frac{2685}{256}e'^2\right)m^4(1+Q)^{-3}\\
&+\left(\frac{10949}{2048}-\frac{6369}{512}\gamma^2-\frac{133839}{1024}e^2+\frac{75759}{1024}e'^2\right)m^5(1+Q)^{-4}\\
&+\frac{467977}{24576}m^6(1+Q)^{-5}\\
&+\frac{26983045}{589824}m^7(1+Q)^{-6}
\end{aligned}$$

(where writing $Q=0$, and omitting the terms in m^4 and m^5 in the coefficient of $(1+Q)^{-1}$, and the term in m^5 in the coefficient of $(1+Q)^{-2}$, we have the original formula of p. 238). We hence have

$$\begin{aligned}
l&=nt\{A+(1+B)Q+CQ^2\},\\
&=nt\{A+Q+BQ+CQ^2\},\\
g&=nt\{A'+B'Q+C'Q^2\},\\
h&=nt\{A''+B''Q+C''Q^2\},
\end{aligned}$$

1871MNRAS..32....7S

where (omitting the terms in $\frac{a^2}{a'^2}$)

$$\begin{aligned}
A = 1 &+ \left(-\frac{7}{4} + \frac{21}{2}\gamma^2 - \frac{3}{4}e^2 - \frac{21}{8}e'^2 + \frac{33}{4}\gamma^4 - \frac{39}{8}\gamma^2 e^2 + \frac{63}{4}\gamma^2 e'^2 - \frac{9}{8}e^2 e'^2 - \frac{109}{32}e'^4\right) m^2 \\
&+ \left(-\frac{225}{32} + \frac{81}{4}\gamma^2 - \frac{675}{64}e^2 - \frac{825}{32}e'^2 - \frac{243}{4}\gamma^4 + \frac{1863}{32}\gamma^2 e^2 + \frac{629}{8}\gamma^2 e'^2 + \frac{2025}{256}e^4 - \frac{105}{32}e'^4\right) m^3 \\
&+ \left(-\frac{3265}{128} + \frac{14577}{128}\gamma^2 - \frac{1833}{64}e^2 - \frac{48225}{256}\right) m^4 \\
&+ \left(-\frac{243925}{2048} + \frac{177333}{256}\gamma^2 - \frac{328065}{4096}e^2 - \frac{1502265}{1024}e'^2\right) m^5 \\
&+ \left(-\frac{12626759}{24576}\right) m^6 \\
&+ \left(-\frac{1365131021}{589824}\right) m^7. \\
B = & \left(\frac{7}{4} - \frac{21}{2}\gamma^2 + \frac{3}{4}e^2 + \frac{21}{8}e'^2\right) m^2 \\
&+ \left(\frac{225}{16} - \frac{81}{2}\gamma^2 + \frac{675}{32}e^2 + \frac{825}{16}e'^2\right) m^3 \\
&+ \frac{9795}{128} m^4 \\
&+ \frac{243925}{512} m^5. \\
C = &- \frac{7}{4} m^2 \\
&- \frac{675}{32} m^3. \\
A' = & \left(\frac{3}{2} - \frac{15}{2}\gamma^2 + \frac{9}{8}e^2 + \frac{9}{4}e'^2 - \frac{45}{4}\gamma^4 + 15\gamma^2 e^2 - \frac{45}{4}\gamma^2 e'^2 - \frac{27}{16}e^4 + \frac{27}{16}e^2 e'^2 + \frac{45}{16}e'^4\right) m^3 \\
&+ \left(\frac{27}{4} - \frac{351}{16}\gamma^2 - \frac{297}{64}e^2 + \frac{401}{16}e'^2 + \frac{135}{2}\gamma^4 - \frac{1053}{32}\gamma^2 e^2 - \frac{1297}{16}\gamma^2 e'^2 + \frac{675}{256}e^4 - \frac{1079}{64}e^2 e'^2\right) m^3 \\
&+ \left(\frac{1995}{} - \frac{16833}{}\gamma^2 - \frac{19209}{}e^2 + \frac{29535}{}e'^2\right) m^4
\end{aligned}$$

1871MNRAS..32....7S

$$+\left(\frac{17709}{128}-\frac{765573}{1024}\gamma^2-\frac{999051}{4096}e^2+\frac{883245}{512}e'^2\right)m$$

$$+\frac{2431349}{4096}m^6$$

$$+\frac{62329307}{24576}m^7.$$

$$B'=\left(-\frac{3}{2}+\frac{15}{2}\gamma^2-\frac{9}{8}e^2-\frac{9}{4}e'^2\right)m^2$$

$$+\left(-\frac{27}{2}+\frac{351}{8}\gamma^2+\frac{297}{32}e^2-\frac{401}{8}e'^2\right)m^3$$

$$-\frac{5985}{64}m^4$$

$$-\frac{17709}{32}m^5$$

$$C=\frac{3}{2}m^2$$

$$+\frac{81}{4}m^3.$$

$$A''=\left(-\frac{3}{4}+\frac{3}{2}\gamma^2-\frac{3}{2}e^2-\frac{9}{8}e'^2-\frac{51}{8}\gamma^2e^2+\frac{9}{4}\gamma^2e'^2+\frac{21}{64}e^4-\frac{9}{4}e^2e'^2-\frac{45}{32}e'^4\right)m^2$$

$$+\left(\frac{9}{32}-\frac{27}{16}\gamma^2-\frac{189}{32}e^2+\frac{23}{32}e'^2+\frac{27}{16}\gamma^4+\frac{567}{16}\gamma^2e^2-\frac{99}{16}\gamma^2e'^2-\frac{675}{256}e^4-\frac{349}{16}e^2e'^2\right)m^3$$

$$+\left(\frac{177}{128}-\frac{219}{128}\gamma^2-\frac{3039}{128}e^2+\frac{2685}{256}e'^2\right)m^4$$

$$+\left(\frac{10949}{2048}-\frac{15825}{1024}\gamma^2-\frac{220707}{2048}e^2+\frac{75759}{1024}e'^2\right)m^5$$

$$+\frac{467977}{24576}m^6$$

$$+\frac{26983045}{589824}m^7$$

1871MNRAS..32....7S

$$
\begin{aligned}
B'' = &+\left(\frac{3}{4} - \frac{3}{2}\gamma^2 + \frac{3}{2}e^2 + \frac{9}{8}e'^2\right)m^2 \\
&+\left(-\frac{9}{16} + \frac{27}{8}\gamma^2 + \frac{189}{16}e^2 - \frac{23}{16}e'^2\right)m^3 \\
&-\frac{531}{128}m^4 \\
&-\frac{10949}{512}m^5, \\
C'' = &-\frac{3}{4}m^2 \\
&+\frac{27}{32}m^3.
\end{aligned}
$$

And in the terms B Q, B′ Q, B″ Q, we have

$$
\begin{aligned}
Q = &\left(1 - \frac{9}{2}\gamma^2 + \frac{9}{8}e^2 + \frac{3}{2}e'^2\right)m^2 \\
&+\left(\frac{27}{8}\gamma^2 + \frac{675}{32}e^2\right)m^3 \\
&-\frac{515}{64}m^4 \\
&-\frac{787}{32}m^5,
\end{aligned}
$$

and in the terms C Q², C′ Q², C″ Q², simply $Q^2 = m^4$. Hence finally the required values of *l*, *g*, *h*, are

$$
\begin{aligned}
l = nt\Big\{1 &+ \left[-\frac{45}{32}m^2 - \frac{7425}{512}m^3\right]\frac{a^2}{a'^2} \\
&+\left(-\frac{3}{4} + 6\gamma^2 + \frac{3}{8}e^2 - \frac{9}{8}e'^2 + \frac{45}{4}\gamma^4 - \frac{69}{8}\gamma^2 e^2 + 9\gamma^2 e'^2 + \frac{3}{32}e^4 + \frac{9}{16}e^2 e'^2 - \frac{45}{32}e'^4\right)m^2 \\
&+\left(-\frac{225}{32} + \frac{189}{8}\gamma^2 + \frac{675}{64}e^2 - \frac{825}{32}e'^2 - \frac{1107}{16}\gamma^4 - \frac{81}{32}\gamma e^2 + \frac{349}{4}\gamma^2 e'^2 + \frac{2475}{64}e^2 e'^2\right)m^3 \\
&+\left(-\frac{4071}{128} + \frac{15852}{128}\gamma^2 + \frac{31605}{512}e^2 - \frac{61179}{256}e'^2\right)m^4 \\
&+\left(-\frac{265493}{} + \frac{335403}{}\gamma^2 + \frac{1483665}{}e^2 - \frac{1767810}{}e'^2\right)m^5
\end{aligned}
$$

1871MNRAS..32....7S

$$+\left(-\frac{12822031}{24576}\right)m^6$$

$$+\left(-\frac{1273925965}{589824}\right)m^7,$$

$$g=nt\left\{\quad\left[\frac{45}{16}m^2+\frac{585}{32}m^3\right]\frac{a^2}{a'^2}\right.$$

$$+\left(\frac{3}{2}-\frac{15}{2}\gamma^2+\frac{9}{8}e^2+\frac{9}{4}e'^2-\frac{45}{4}\gamma^4+15\gamma^2e^2-\frac{45}{4}\gamma^2e'^2-\frac{27}{64}e^4+\frac{27}{16}e^2e'^2+\frac{45}{16}e'^4\right)m^2$$

$$+\left(\frac{27}{4}-\frac{351}{16}\gamma^2-\frac{297}{64}e^2+\frac{401}{16}e'^2+\frac{135}{2}\gamma^4-\frac{1053}{32}\gamma^2e^2-\frac{1297}{16}\gamma^2e'^2+\frac{675}{256}e^4-\frac{1079}{64}e^2e'^2\right)m^3$$

$$+\left(\frac{1899}{64}-\frac{15009}{128}\gamma^2-\frac{20649}{512}e^2-\frac{28959}{128}e'^2\right)m^4$$

$$+\left(\frac{15981}{128}-\frac{663621}{1024}\gamma^2-\frac{1152843}{4096}e^2+\frac{847213}{512}e'^2\right)m^5$$

$$+\frac{2103893}{4096}m^6$$

$$+\frac{52802843}{24576}m^7,$$

$$h=nt\left\{\quad\left[-\frac{45}{32}m^2-\frac{1935}{512}m^3\right)\frac{a^2}{a'^2}\right.$$

$$+\left(-\frac{3}{4}+\frac{3}{2}\gamma^2-\frac{3}{2}e^2-\frac{9}{8}e'^2-\frac{51}{8}\gamma^2e^2+\frac{9}{4}\gamma^2e'^2+\frac{21}{64}e^4-\frac{9}{4}e^2\ {}'^2-\frac{45}{32}e'^4\right)m^2$$

$$+\left(\frac{9}{32}-\frac{27}{16}\gamma^2-\frac{189}{32}e^2+\frac{23}{33}e'^2+\frac{27}{16}\gamma^4+\frac{567}{16}\gamma^2e^2-\frac{99}{16}\gamma^2e'^2-\frac{675}{256}\ {}^4-\frac{349}{16}e^2e'^2\right)m^3$$

$$+\left(\frac{273}{128}-\frac{843}{128}\gamma^2-\frac{2739}{128}e^2+\frac{3261}{256}e'^2\right)m^4$$

$$+\left(\frac{9797}{2048}-\frac{7185}{1024}\gamma^2-\frac{165411}{2048}e^2+\frac{73423}{1024}e'^2\right)m^5$$

$$+\frac{199273}{24576}m^6$$

$$+\frac{6657733}{589824}m^7,$$

1871MNRAS..32...16G

which values satisfy, as they should do, the equation $l + g + h = nt$. I recall that the precise signification of the constants is as follows:—n is the coefficient of t in the expression of the Moon's longitude in terms of the time, a the corresponding elliptic value of the mean distance ($n^2 a^3 =$ sum of masses), e the excentricity, such that in the expression of the longitude the coefficient of the leading term of the equation of the centre has its elliptic value

$$= 2e - \frac{1}{4}e^3 + \frac{5}{96}e^5$$

and γ the sine of the half-inclination, such that in the expression of the latitude the coefficient of the leading term has its elliptic value

$$= 2\gamma - 2\gamma e^2 - \frac{1}{4}\gamma^5 + \frac{7}{32}\gamma e^4 + \frac{1}{4}\gamma^5 e^2 - \frac{5}{144}\gamma e^6$$

n', a' are the mean motion and mean distance of the Sun, $m = \frac{n'}{n}$, and e is the excentricity of the Sun's orbit, considered as constant.

Extract of a Letter from Dr. B. A. Gould to the Astronomer Royal, dated Cordoba, Sept.* 30, 1871.

"Our work here has prospered as well as is consistent with the absolute impossibility of beginning it. That is to say, although the Observatory is, up to this present day, twelve and a half months after my arrival, not yet sufficiently complete to enable the instrumental observations for which I came here to begin, the Uranometry has more than fulfilled my most earnest hopes, and has enabled us to work very hard to useful purpose. Between the South Pole and +10° North Declination I have a catalogue of over 7100 stars visible to the naked eye on good nights, reaching to the magnitude which I am at present provisionally designating as 6·6 mag. All these stars have either been identified in the Catalogues or found not to be contained therein, and all their places have been referred to the mean equinox of our adopted epoch. And the magnitudes of all have already been so fully studied that I believe the mean error of the determinations cannot well exceed 0·1 mag. There are relatively few which have not been determined at least twice, and for the majority there are at least four determinations of magnitude, and of course by more than one observer in every case. Another month ought to complete the work of cataloguing and identifying, and of excluding such as, although they have been seen on favourable nights, are below the inferior limit which I have fixed

---

* Argentine Republic, about Lat. 31° S.—*Ed.*